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TO : The Files - Contract 605, Task Order 8

DATE: 8 March 1960

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FROM :

SUBJECT: Trip Report -

DOC	35	REV DATE	30 APR 1960	BY	018373
ORIG COMP	33	GPI	52	TYPE	02
ORIG CLASS	5	PAGES	12	REV CLASS	C
JUST	22	NEXT REV	2010	AUTH	HR 70-2

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1. On 25 February 1960 the writer visited [redacted] for the purpose of discussing progress on Contract 605. Present for discussions concerning this work were:

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2. 30 to 1,000 mc Antenna, Task Order 6 - The construction of the first of these antennas is almost completed. Latest test data indicates that a VSWR of less than 2:1 will be obtained over the entire operating range of this antenna. The antenna's longest element is 17 feet and the boom is 22 feet long. The assembled antenna weighs approximately 115 lbs. Gain will average 7 to 8 db over isotropic. The feed assembly consists of two parallel coaxial lines laid along the sides of the boom which are supported by fiberglass. The fiberglass is required to prevent shorting of the two coaxial lines under icing conditions. [redacted] has had considerable difficulty in finding paints for fiberglass which will not impair the electronic performance of antenna arrays. The boom is presently painted white. At our request [redacted] is trying to find a dull gray paint with a non-metallic base to paint the boom. The boom design has been somewhat complicated because of the sectionalization required which allows the removal of back sections of the antenna to decrease both antenna size and frequency response if desired. Because of this and the paint problem it is now anticipated that there will be approximately a \$4,000 overrun on this contract. The writer feels that because of the improved antenna performance which has been obtained in recent weeks, the overrun will be justified. Delivery of the first of a quantity of five antennas is expected within 15 days.

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3. Antenna-Filter-Detector System, 50-4,000 mc, Task Order 8

- a. 50-500 mc Antenna - [] has been very successful in producing a small antenna operating over the range of 50-500 mc which can be printed on 1 mil mylar. The final antenna configuration will be such that the entire antenna may be folded and placed in a shirt pocket. [] has designed two antennas in this frequency range; one is 24" x 32", and another which is 36" x 40". The smaller of these antennas will operate with at least isotropic gain down to 200 mc, while the larger will perform very satisfactorily to 150 mc. Although antenna performance in either case suffers considerable degradation at frequencies down to 50 mc, they will represent a considerable improvement over existing concealed antennas.
- b. 50-10,000 mc Antenna - Problems of printed circuit board registration between the two half structures for this antenna have largely been solved. The present model of the antenna provides a VSWR well under 3:1 and gains of 6 to 7 db over isotropic. Because of the small size of the antenna elements at 10 kmc, it was found advisable to gold-plate the entire antenna assembly to prevent corrosion due to finger smudges.
- c. 10-40 kmc Electromagnetic Horn Antenna - [] is presently having difficulty fabricating a suitable first prototype of this antenna. The present technique involves fabrication of the horn from silver plated brass sheets. A piece of K-band wave guide is then braised at the back of the horn assembly. During the braising process the discontinuities provided by the braising inside the horn will probably inhibit performance of the antenna at the upper frequency limit. Because only two horns are being built for this program it is economically unfeasible to produce them by electroforming techniques. As a result the first models will probably have to be hand finished after assembly.

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In addition [] is having difficulty with the artificial dielectric filter elements which are to be inserted in the horn throat to raise the lower cut-off frequency of the horn, thus providing high pass filter action. The small cross-section of K-band wave guide requires the use of a relatively small and therefore weak piece of artificial dielectric. [] feels that they can increase the strength of the artificial dielectric slab by encasing its narrow portion in Teflon which will, upon insertion of the filter into the wave guide, completely fill the wave guide, thus providing structural rigidity.

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- d. Filters - [] has not as yet constructed any band-pass filters required for this project. Because of the steep skirt selectivity which we requested they have been forced to use very high order polynomial equations to synthesize the proper characteristic. These equations are presently being solved on an IBM 650 computer and as soon as proper design parameters are obtained on the computer, first models of the filters will be assembled for test.

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- e. Detectors - [] has obtained suitable detectors from Sage for use on this program. Preliminary tests of these detectors working into both a VA-7 and a VA-9 video amplifier indicate that the VA-9 unmodified provides approximately 10 db poorer performance than the VA-7, while the modified version of the VA-9 provides approximately 15 db poorer performance than the VA-7. Although the writer observed the tests of detector performance at [] he could find no fault with the test procedure. He is nevertheless quite certain that these measurements are incorrect. Pending a decision by CIA as to which video amplifier to use for system check-out, no final system testing will be done at []

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4. 500 to 10,000 mc Procurement - [] has not as yet received contractual documents for this procurement. However, they

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have ordered the necessary materials for the construction of 25 of these antennas. We are informed by [REDACTED] that suitable bandpass filters with 40 db skirts are not available commercially. [REDACTED] suggests however that filters might be built in a relatively short time by one of the following companies:

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P.R.D., Sanders Associates,
Nashua, New Hampshire

Microphase Electronics

Stanford Research Institute

[REDACTED] does not desire to produce a set of bandpass filters for use with these antennas because of the very long delivery time which might be anticipated.

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5. The antenna department at [REDACTED] is considering the construction of an instantaneous D/F antenna system. The system would consist of a parabolic dish feed with two feeds. One feed would produce a conventional 10 db taper and a single lobe while the second feed would produce a split lobe whose 3 db cross-over point would occur along the axis of the parabola. By comparing the phase of the single beam alternately to the phase of the two lobes of the split beam, highly accurate D/F information could be obtained.

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6. [REDACTED] is about to begin construction of a series of parabolic dish feeds covering 1-10 kmc. The f/d ratio which they will use will be 0.4, the same as that used for our previous dish development at [REDACTED] indicated that we could procure a quantity of these feeds built to operate with the dishes which we already possess if we so desired.

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7. Attached are VSWR patterns and tentative assembly diagrams of the 30-1,000 mc antenna.

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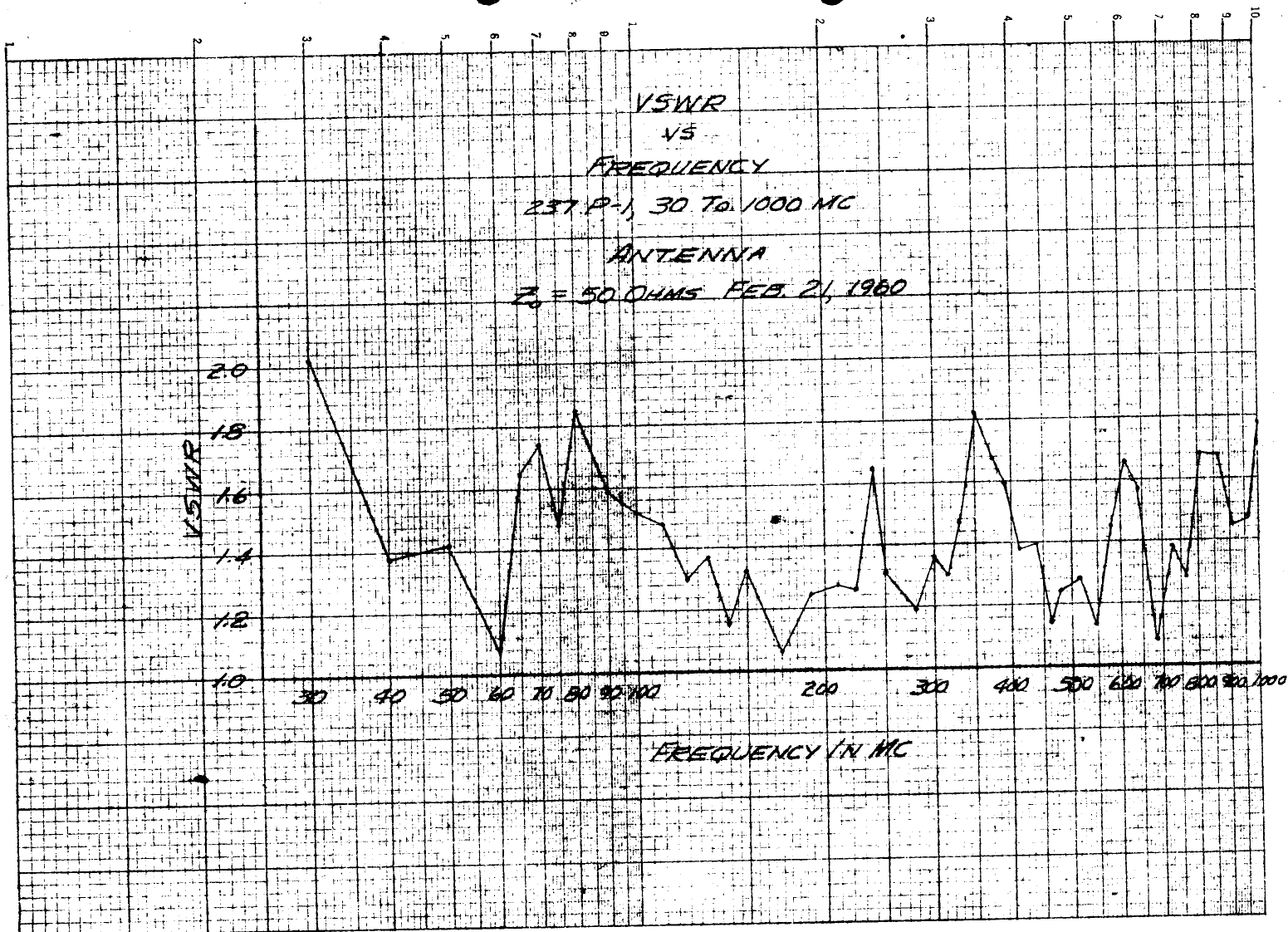
Distribution:

R+D Subject File, w/attach.
Monthly Report (2), w/o attach.
R+D Lab, w/o attach.
OC-SP, w/o attach.
EP Chrono, w/o attach.

Attachment: VSWR Patterns & -- 4 --
Diagrams

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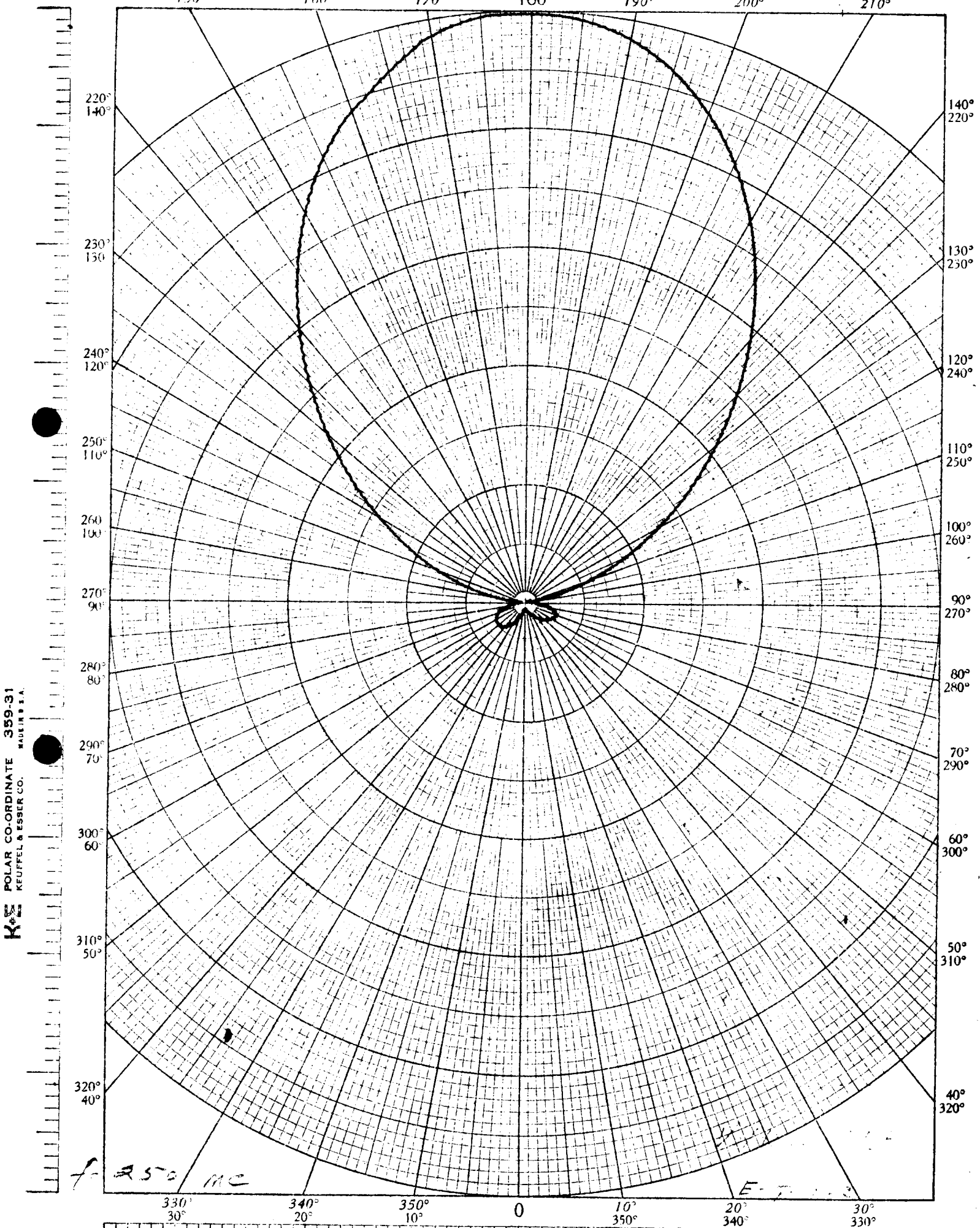
K² KEUPPEL & ESSER CO.
2 CYCLES X 70 DIV

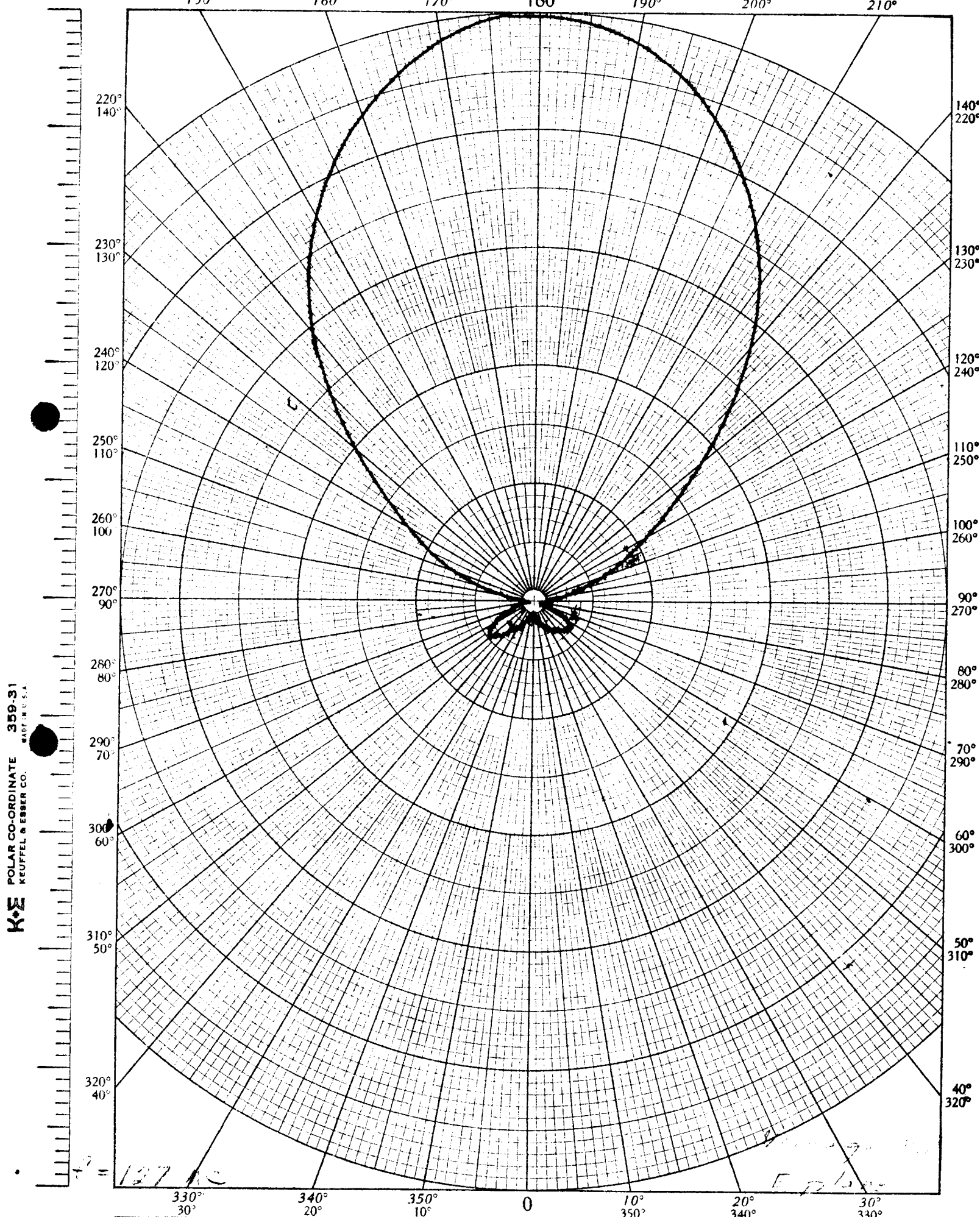


30-TO-1000 MC

TYPICAL PATTERN (VOLTAGE)

E-PLANE



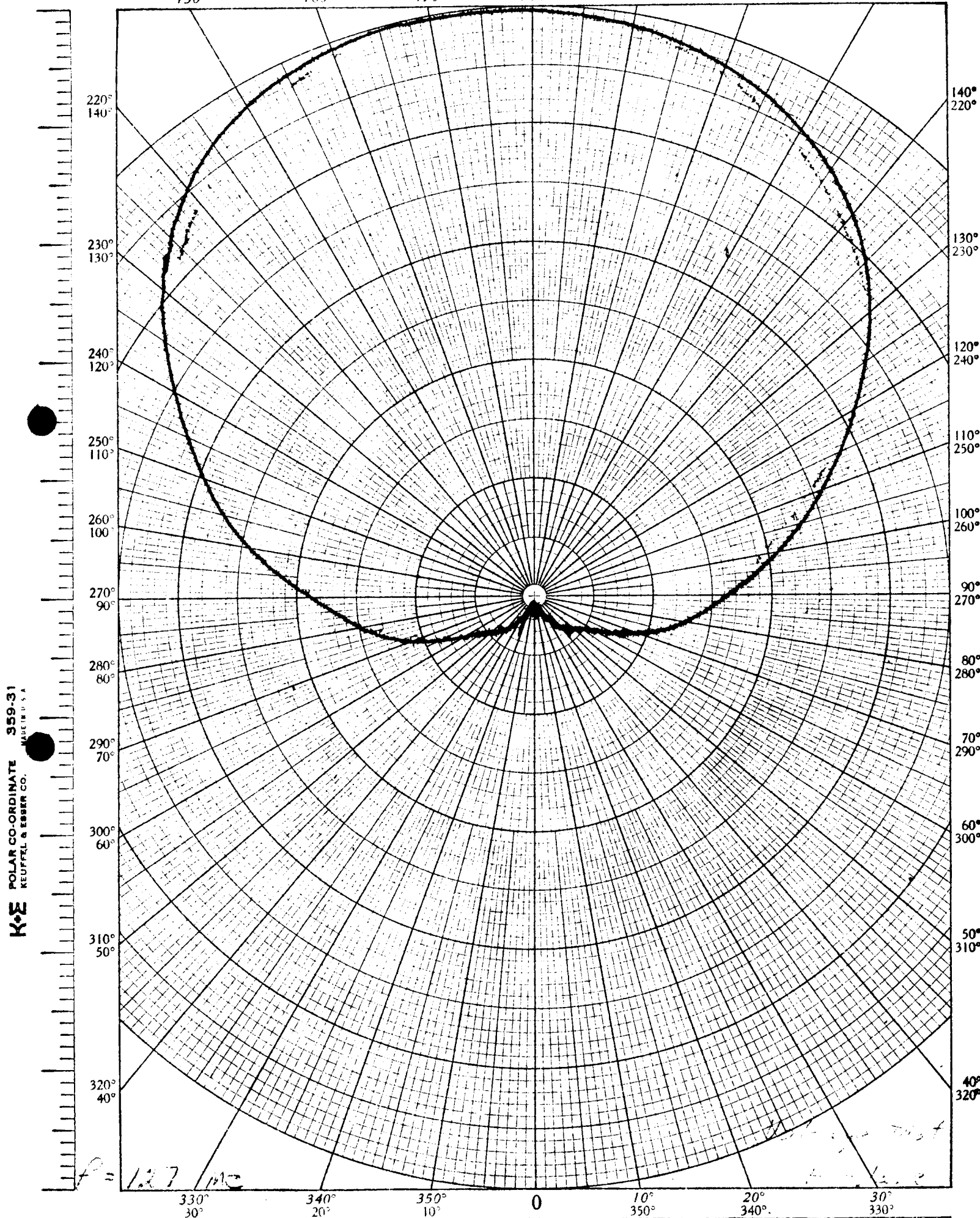


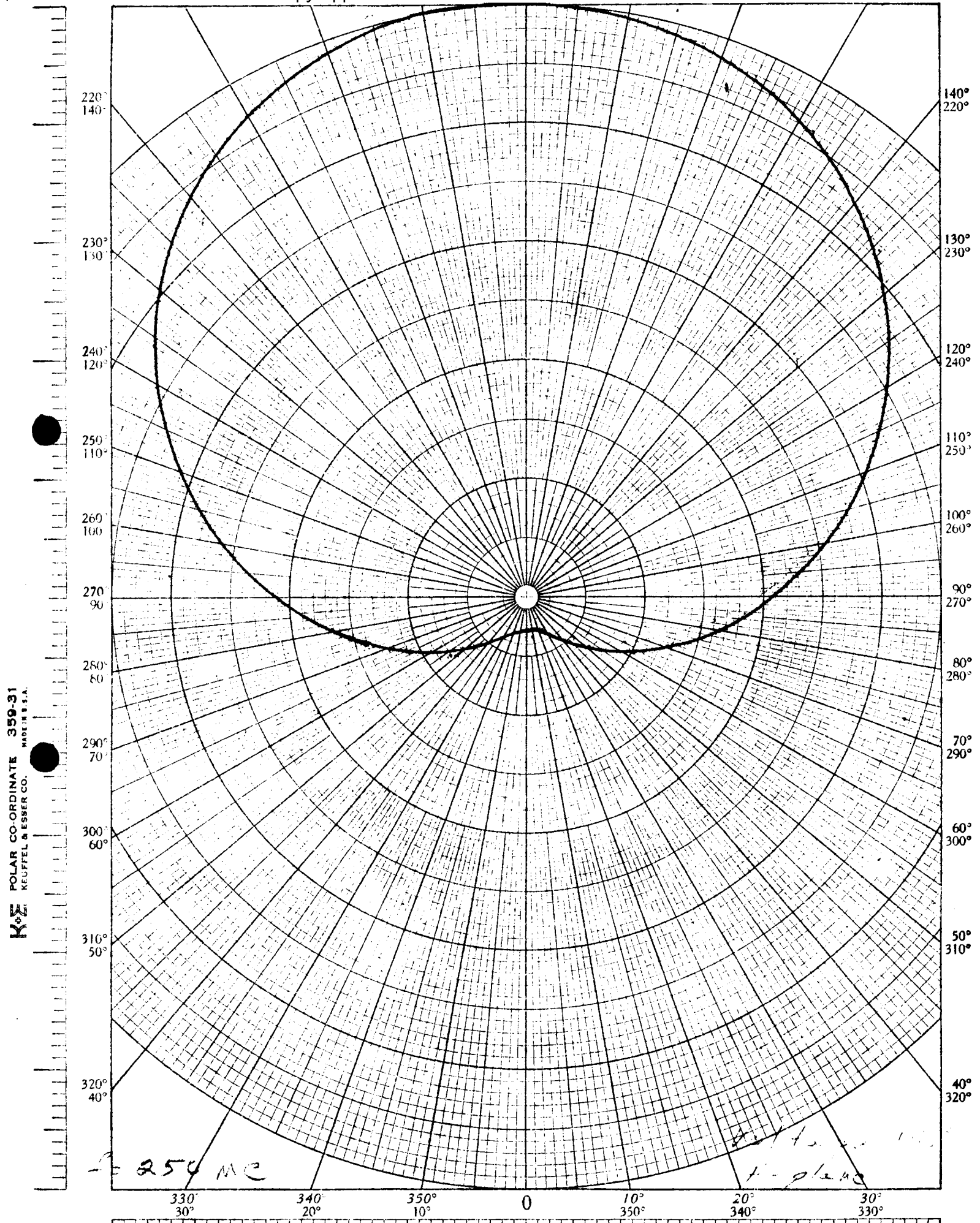
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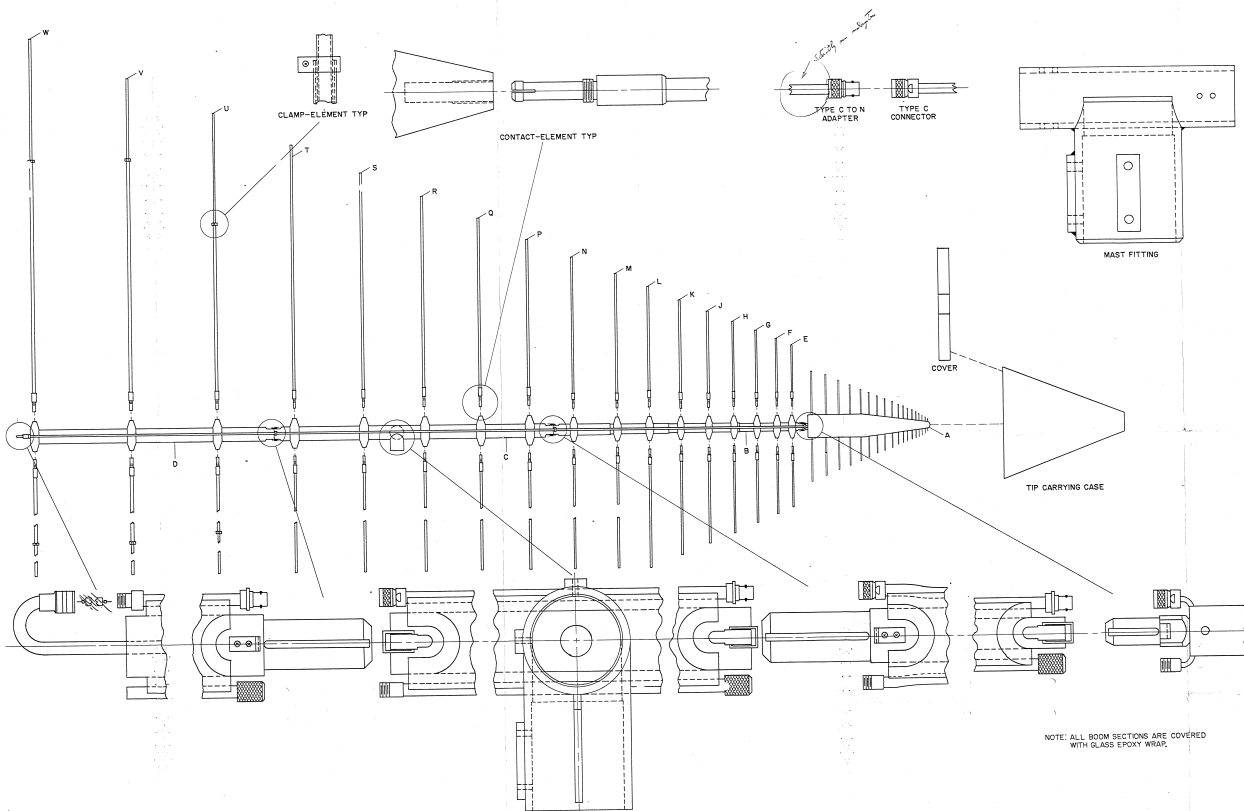
30-TO-1000 MC

TYPICAL PATTERN (VOLTAGE)

H-PLANE







REFERENCE ONLY

DATE	2/23/60	BY	WSP
REVISION	1	DATE	2/23/60
C-626-01-6 PLANNING LP ANTENNA ASSEMBLY			